

Functional characterisation of new sesquiterpene synthase from the Malaysian herbal plant, *Polygonum minus*

ABSTRACT

Polygonum minus (syn. *Persicaria minor*) is a herbal plant that is well known for producing sesquiterpenes, which contribute to its flavour and fragrance. This study describes the cloning and functional characterisation of PmSTPS1 and PmSTPS2, two sesquiterpene synthase genes that were identified from *P. minus* transcriptome data mining. The full-length sequences of the PmSTPS1 and PmSTPS2 genes were expressed in the *E. coli* pQE-2 expression vector. The sizes of PmSTPS1 and PmSTPS2 were 1098 bp and 1967 bp, respectively, with open reading frames (ORF) of 1047 and 1695 bp and encoding polypeptides of 348 and 564 amino acids, respectively. The proteins consist of three conserved motifs, namely, Asp-rich substrate binding (DDxxD), metal binding residues (NSE/DTE), and cytoplasmic ER retention (RxR), as well as the terpene synthase family N-terminal domain and C-terminal metal-binding domain. From the in vitro enzyme assays, using the farnesyl pyrophosphate (FPP) substrate, the PmSTPS1 enzyme produced multiple acyclic sesquiterpenes of β -farnesene, α -farnesene, and farnesol, while the PmSTPS2 enzyme produced an additional nerolidol as a final product. The results confirmed the roles of PmSTPS1 and PmSTPS2 in the biosynthesis pathway of *P. minus*, to produce aromatic sesquiterpenes.

Keyword: *Polygonum minus*; Farnesol; Nerolidol; Sesquiterpene synthase

